

WPS-2365

POLICY RESEARCH WORKING PAPER

2365

Leading Indicator Project

Lithuania

Stephen S. Everhart

Robert Duval-Hernandez

A method for forecasting growth cycles in economic activity (measured as total industrial production), as applied to Lithuania.

The World Bank
Europe and Central Asia
and
Latin America and the Caribbean Regions
Poverty Reduction and Economic Management Sector Units
and
Mexico Country Management Unit
June 2000



Summary findings

Everhart and Duval-Hernandez present a method for forecasting growth cycles in economic activity, measured as total industrial production.

They construct a series which they aggregate into a composite leading indicator to predict the path of the economy in Lithuania.

The cycle is the result of the economy's deviations from its long-term trend. A contractionary phase means a decline in the growth rate of the economy, not necessarily an absolute decline in economic activity.

The indicator they select for economic activity is usually the Index of Industrial Production, plus a group of variables that, when filtered and adjusted, becomes the composite leading indicator that forecasts the reference series. Variables include economically and statistically significant financial, monetary, real sector, and business survey data.

They base selection of the components of the leading indicator on the forecast efficiency and economic

significance of the series. Once selected, the relevant variables are aggregated into a single composite leading indicator, which forecasts the detrended Index of Industrial Production.

They apply the Hodrick-Prescott filter method for detrending the series. This is a smoothing technique that decomposes seasonally adjusted series into cyclical and trend components. One advantage of the Hodrick-Prescott filter is that it provides a reasonable estimate of a series' long-term trend.

The OECD uses a system of leading indicators to predict growth cycles in the economies of its member countries. These exercises have been very effective in their forecasting ability and accuracy — but for the technique to work it is essential to have an adequate statistical system that provides many economic variables in a precise and timely manner, preferably monthly. The authors extend the OECD technique and present an application to a country of the former Soviet Union.

This paper — a joint product of the Poverty Reduction and Economic Management Sector Units, Europe and Central Asia and Latin America and the Caribbean Regions, and the Mexico Country Management Unit — is part of a larger effort in the Bank to foster the development of macroeconomic monitoring techniques. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Michael Geller, room I4-142, telephone 202-458-5155, fax 202-522-2019, email address mgeller@worldbank.org. Policy Research Working Papers are also posted on the Web at www.worldbank.org/research/workingpapers. Copies of the Eviews and Excel files may be obtained from the authors by email at severhart@worldbank.org or rduval@worldbank.org. June 2000. (18 pages)

The Policy Research Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about development issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the view of the World Bank, its Executive Directors, or the countries they represent.

Leading Indicator Project: Lithuania

Stephen S. Everhart
Senior Financial Economist

and

Robert Duval-Hernandez
Consultant

The World Bank / Banco Mundial
Mexico City Mission Office
Severhart@worldbank.org

This project was co-sponsored by the World Bank and U.S.A.I.D., initiated by Sheila Tschinkel, U.S.A.I.D. consultant to the Bank of Lithuania, and Marcelo Giugale, Mexico Lead Economist -World Bank. A word of thanks is in order for Giedre Tarbuniene, Economist, Vilnius Office-World Bank, and Jos Verbeek, Lithuania Country Economist-World Bank.

A special note of thanks to our counterparts at the Bank of Lithuania: Zilvinas Kalinauskas, Senior Economist, Vadimas Titarenko, Chief Economist, and Raimondas Kuodis, Head of Division-Macroeconomics and Forecasting.

ABSTRACT

This project constructs a composite-leading indicator (CLI) to forecast economic activity in Lithuania. This cycle is the result of deviations of the economy from its long-term trend. Here, a contractionary phase means a decline in the rate of growth of the economy, and not necessarily an absolute decline in economic activity.

For this analysis it is necessary to select an indicator of economic activity (usually the Index of Industrial Production, IIP), as well as a group of variables that, when filtered/adjusted construct the CLI that forecasts the reference series. Selection of the components of the leading indicator is based on the forecast efficiency of the series and on their economic significance. Once selected, the relevant variables are aggregated into a single CLI that forecasts the detrended IIP. For detrending the series, the Hodrick-Prescott (HP) Filter method is applied. This method is a smoothing technique that decomposes seasonal adjusted series into cyclical and trend components. One of the advantages of the HP Filter is that provides a reasonable estimate of the long-term trend of a series.

INTRODUCTION: LEADING INDICATORS AND FORECASTING OF ECONOMIC ACTIVITY

This manual presents a forecasting method to predict growth cycles in economic activity, measured by the total industrial production.¹ The analysis of series that having a leading relationship to the reference series forms the basis of the prediction. These series are aggregated in a single composite-leading indicator (CLI) that predicts the path of the economy. A. Burns and W. Mitchell at the National Bureau of Economic Research developed this technique during the 1930s and 1940s. The composite index presented in the following sections is a variant of the one elaborated by the OECD, Statistics Division. The modifications incorporate statistical techniques that facilitate the estimation process.

To understand the interpretation of this index it is important to identify what is being predicted. The *growth cycle* is understood to be the result of deviations of the economy from its long-term trend.² Here a contractionary phase means a decline in the

¹ The forecast variable is referred to as the "reference series."

² Strictly speaking it is hard to decompose the trend-cycle component in a time series. Nevertheless, here it is assumed that this decomposition is possible by estimating a long-run trend. See annex on moving average decompositions.

rate of growth in the economy and not necessarily an absolute decline in economic activity.³

The group of series that form the composite index share a leading relationship with respect to the growth cycle. They are usually selected from a large set of economic variables that include financial, monetary, real sector, and business survey data, taking into account their statistical and economic significance.

The system of leading indicators is widely used by the OECD to predict the growth cycles in the economies of their member countries. These exercises have been very effective in their forecasting ability and accuracy.⁴ However, for this technique to work properly it is essential to have an adequate statistical system that provides a large set of economic variables, in a timely and precise manner, preferably on a monthly basis.

DESCRIPTION OF THE MAIN PROCEDURES

The methodology can be outlined as follows:

1. Selection of the reference series to be forecast (IIP).
2. Determination of the cycles on the reference series, after adjustments for seasonal and trend effects.
3. Selection of the components of the CLI. This selection is based on lead/lag tables, cross correlograms and inspection.
4. Estimation of seasonal adjusted versions of the selected series.
5. Detrending the seasonally adjusted component series of the CLI with the Hodrick-Prescott Filter.
6. Smoothing the cyclical components with Months for Cyclical Dominance (MCD) moving averages, and adjusting their average cyclical amplitude by means of standardization.
7. Aggregation of the components into the CLI.
8. Comparison of the reference series and the CLI in their detrended version, and if desired, restore trend to the series.

³ Burns and Mitchell (1946) provide one of the classic definitions of business cycle.

⁴ See for example the study on Mexico by Beziz & Petit (1997).

SELECTION OF THE SERIES

Reference Series

The reference variable is the benchmark that indicates fluctuations in the economic activity, and is the variable to be forecast. Usually chosen is the Industrial Production Index, IIP, which has the advantage of being a monthly reported variable, available for many countries, and measures the real sector of the economy. For Lithuania this was the variable selected and was seasonally adjusted with a multiplicative X11-Census procedure.⁵

Composite Indicator Series

As previously mentioned, the essential feature taken into account for selecting a component of the CLI is that it leads the reference series with a similar cyclical profile. Other salient features are: the consistency of the lead of the indicator over the reference cycle at turning points, the absence of extra or missing cycles, smoothness, freedom from excessive revisions by the authorities, timeliness in delivery from the authorities, and availability of a long run of data of satisfactory reliability with no breaks. Monthly series are preferred.

All series are analyzed using their trend-eliminated version. The analysis proceed by performing a graphical inspection of the cyclical profile of the series, reinforced by a turning point analysis (see Annex 4), with special attention to mean or median leads at turning points. A cross correlogram of the series completes the initial review.

The series analyzed for Lithuania come from the Bank of Lithuania website, the IMF-International Financial Statistics, and the MEI Database via the OECD's OLISnet service. From these databases approximately 130 series were selected for graphical inspection. Many were rejected because of incomplete or insufficient data (less than two years) or cyclical patterns seemingly inconsistent with that of the reference variable (IIP). Twenty-six variables passed this first filter, among them: measures of employment, finance, interest rates, prices, and trade. The seasonally adjusted version of these

⁵ See below for details, p.6.

variables was analyzed in greater detail by means of cross-correlations and graphical inspection.

Nine series were selected out of this universe and were tested for inclusion in the CLI. These series:

- Unemployment
- Quasi-money
- Litin (a stock market index)
- Government Lending Funds in Deposit Money Banks
- Real Effective Exchange Rate
- Interest rate of loans in litas, 1-5 years⁶
- Foreign Currency Deposits in banking institutions
- Foreign Assets⁷
- Domestic Credit

Although some of the preceding series may not be included in the final index, all exhibit a close cyclical relation with industrial production and were tested for inclusion in the CLI.

DETRENDING THE SERIES: HODRICK-PRESCOTT FILTER

The Hodrick-Prescott Filter is a smoothing technique commonly used to estimate the long-run trend of a series. This technique decomposes seasonally adjusted time series into two components: the trend and the cycle, and provides a smoothed trend as a solution to a minimization problem (see Annex 3).

Given the extensive use of the HP Filter as an estimate, here it is used as a substitute of the Phase Average Trend method, originally applied in this forecasting exercise. Both techniques provide similar estimates, but the HP Filter has the advantage of being included as a built-in command in EViews. The detrending of the reference series and the components of the CLI is done using this filter.

⁶ Use the reciprocal

⁷ Use the reciprocal

SEASONAL ADJUSTMENT OF THE SERIES

Elimination of the seasonal component of the series is done with the X-11 census moving average procedure. This method consists of routines using a ratio-to-moving average decomposition, adjusted for trading day and holiday variations. One of the advantages of this approach (compared with other moving averages that remove seasonality) is that it allows seasonal factors to change from year to year.

MCD SMOOTHING OF CLI COMPONENTS

Smoothing the variability of the components of the CLI requires application of a moving average to each component. The procedure used here is the months of cyclical dominance (MCD) moving average. This procedure has the advantage of determining the length of the moving average necessary to control fluctuations in the irregular component of the series, with a minimal loss of values in the beginning/ending of the series (see Annex 1).

MCD is defined as the number of months needed for the average change in the irregular component to become smaller than the average change in the trend component. Changes in the irregular component dominate those in the trend-cycle during the first months. However, as the time span increases, changes in the trend cycle will become larger and dominate those in the irregular component. Once the MCD scalar has been obtained for each series, it will be used as the length of a moving average⁸ that removes the irregular component of the series.

NORMALIZATION AND AGGREGATION OF THE SERIES

With the MCD smoothed series we construct the CLI. It is necessary to normalize the series prior to aggregation, thus standardizing their amplitude. The normalized series are aggregated into a single leading indicator by a simple averaging process (see Annex 3). In case one of the series presents missing values for some period,⁹ no linking factor is

⁸ For practical reasons the length of this MA it is usually restrained in between 1 and 6 periods.

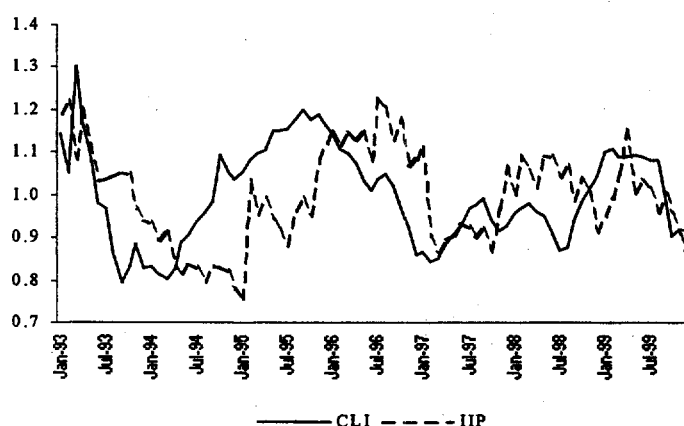
⁹ This would be the case of Real Effective Exchange Rate and Litin series for Lithuania.

used when averaging.¹⁰ This may generate jumps in the composite index, though a closer inspection of the simple average shows that there is no significant bias in the final estimation.¹¹

RESULTS FOR THE LITHUANIAN CASE

The nine series selected, for their close relationship with the IIP, can be combined in several ways in the construction of the composite index. In this exercise a particular CLI is composed of the following variables: government lending funds in deposit money banks, interest rate of loans in litas 1-5 years (reciprocal), quasi-money, unemployment and real effective exchange rate. These variables appear to be effective in predicting recent movements in the reference series. It is important to note that these components are by no means definitive. Their relevance must be re-evaluated from time to time, based on their predictive ability. Series (other than the nine previously listed) must be examined to see if they present cyclical patterns that are consistent with the IIP cycle.¹² Figure 1.1 presents the CLI and reference series estimated in December 1999.

Figure 1.1 Composite Leading Indicator and IIP, December 1999



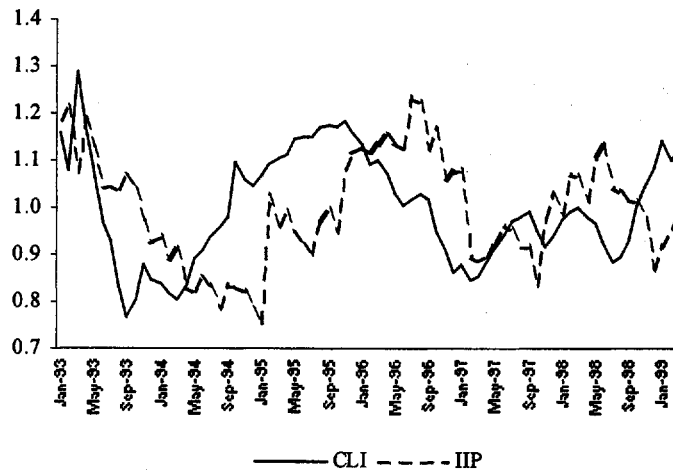
¹⁰ A *linking factor* is used to link an index with incomplete series to the body of the complete index. Its estimation involves applying the growth-rate of the incomplete index to the last point of the full index (see OECD, 1987).

¹¹ It must be kept in mind that the introduction of a linking factor may also generate a bias because of the risky assumption that the incomplete series follows the same growth pattern that the rest of the series.

¹² In particular, for Lithuania it would be of great help to consider business survey data. These surveys of expectations of future trends have proven useful in other countries.

To see the effectiveness of the CLI in predicting the cycles of the Lithuanian economy it is useful to make a backcast estimation, where the forecasting ability of the composite index is tested against cycles that are known to have happened. This exercise is displayed in Figure 1.2. In March 1999 the composite index had already predicted the downturn in industrial production that would occur one month hence.

Figure 1.2 Composite Leading Indicator and IIP, March 1999



THE EXECUTION AND UPDATE OF THE CLI PROGRAM

The main steps involved in the execution and update of the CLI program are sketched below:

Step 1. It is necessary to update the monthly database in the Excel file LITUDATA.XLS. The updating process consists of adding the most recent value of each variable to the file. Some variables, such as the Real Effective Exchange Rate, are subject to revisions and corrections, therefore updating then requires the replacement of the whole series.

After the database is updated, the EViews program *finalprog.prp* must be run.

Step 2. It is necessary to specify the period in the program. To do so, the first line of the program must be modified:

WORKFILE a:\LITCYCLES M 1993:1 1999:12

With this command the EViews workfile *Litcycles* is created on drive a:\ (this drive path can be modified), from January 1993 to December 1999. As the file is updated the last date in the command must be changed.

Step 3. Another item to be specified is the location of the file that contains the original data set (in this case LITUDATA.XLS). In the command below the default location is drive a:\

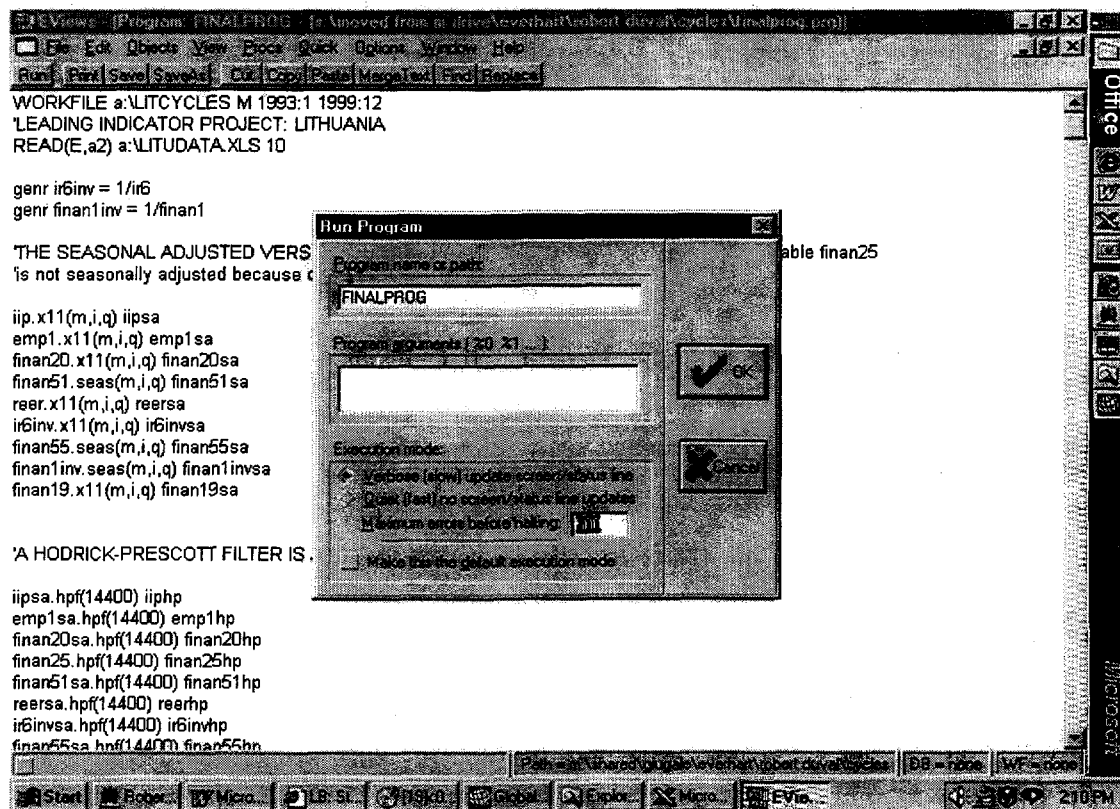
READ(E,a2) a:\LITUDATA.XLS 10

The number 10 at the end of the command denotes the number of series in the LITUDATA database. This number is modified only in case one variable is added (deleted).

Step 4. Once the basic date adjustments have been completed, the program can be run by hitting the “Run” button in the choice menu at the top of the screen. The software will open a “Run Program” window where the operator must specify the maximum number of errors to be tolerated before halting (see Figure 1.3). This option can be arbitrarily set at 500, since Eviews treats missing values as an error and warning messages appear as the program runs.¹³

¹³ The only error message that should appear is of the type “FP Exception - possible illegal operation on NA - Missing data generated in...”. Any other type of error message indicates real problems with the program.

Figure 1.3 EViews “Run” command window



When the errors option has been set, press “OK” and the Leading Indicator is calculated and plotted.

The variable *cliamp* contains the CLI, while *iipcyc* contains the reference series. Both variables are generated in the file LITCYCLES.WK1.

Step 5 (optional). The program estimates the composite index using only five out of the nine series previously mentioned. In order to add (or subtract) any series to the CLI the program must be modified. Go to the ‘Aggregation of the series’ section at the end of the program, where the averaging commands are included:

```
smpl @first @first
genr agr1 = ((finan20norm+emp1norm)/2)/100
smpl @first+1 @first+1
genr agr1 = ((ir6invnorm+finan20norm+emp1norm)/3)/100
```

```

smpl @first+2 @first+9
genr agr1 = ((ir6invnorm+finan51norm+finan20norm+emp1norm)/4)/100
smpl @first+10 @last-2
genr agr1 =
((ir6invnorm+finan51norm+finan20norm+emp1norm+reernorm)/5)/100
smpl @last-1 @last
genr agr1 = ((ir6invnorm+finan51norm+finan20norm+emp1norm)/4)/100

```

The command *smpl* denotes the sampling period over which a variable is being averaged. In other words, the averaging process is split into periods because of the missing values in the series, particularly in the beginnings/endings. The term *@first* is used to identify the first observation, *@first+1* is used for the second observation, and so on. The command *genr* creates the variable *agr1*, the average of the normalized components of the composite index. To add (or subtract) one variable to the CLI, the programmer has to write (or delete) the name of the variable followed by the termination *...norm*. If the number of series has changed, then the denominator of the ratio has to be modified in accordance to the number of averaged elements, e.g., have 5 as a denominator if the sum contains 5 summands. Here the programmer must be careful to include the new variable only in those periods in which it presents non-missing values.

The following example illustrates the adding of a new hypothetical variable named *newvar*, which has non-missing values from March 1993 to date. The program should be modified in the following way:

```

smpl @first @first
genr agr1 = ((finan20norm+emp1norm)/2)/100
smpl @first+1 @first+1
genr agr1 = ((ir6invnorm+finan20norm+emp1norm)/3)/100
smpl @first+2 @first+9
genr agr1 = ((ir6invnorm+finan51norm+finan20norm+emp1norm+newvar)/5)/100
smpl @first+10 @last-2
genr agr1 =
((ir6invnorm+finan51norm+finan20norm+emp1norm+reernorm+newvar)/6)/100
smpl @last-1 @last
genr agr1 = ((ir6invnorm+finan51norm+finan20norm+emp1norm+newvar)/5)/100

```

Please note that the variable appears only for the sampling period for March 1993 to date (@first+2 @last). Also note that the denominator has changed in the relevant command because of the adding of a new variable.

ANNEXES

1) MOVING AVERAGE SMOOTHING TECHNIQUES

Introduction to MA decomposition of time series

Time series (Y) can be thought of as the combination of several components: a trend (T), a cyclical component (C), a seasonal component (I), and a random component (E). These components may be assumed to build the series in a multiplicative (1) or an additive (2) way.

$$Y_t = I_t T_t C_t E_t \quad (1)$$

$$Y_t = I_t + T_t + C_t + E_t \quad (2)$$

The decomposition of the series in its components is one of the objectives of time series analysis. One simple approach to this problem is the use of moving averages on the series.

A moving average (MA) is a formula that approximates the original series by averaging individual observations as follows

$$M(Y, n) = \frac{(Y_1 + Y_2 + \dots + Y_n)}{n} \quad (3)$$

What equation (3) states is that individual values in M are the result of averaging n observations of Y . As we move to other observation of M , different values of Y will be averaged. In other words, it is a polynomial applied at different phases of the series. MA procedures can be used to eliminate one or several components of the series, depending on the length, n , of the process. If the MA process is used to eliminate randomness from a series, then the larger the randomness, the greater n must be. As n becomes larger, other components (seasonal, cyclical, etc.) will be eliminated.

Weighted MA techniques

Of course one MA process can be estimated on another moving average,

$$M'(Y, n) = \frac{(M_1 + M_2 + \dots + M_n)}{n} \quad (3.1)$$

These series are called nxn moving averages and they have the peculiarity of weighting observations such that central observations have a larger weight than distant ones. Another way of conceptualizing these averages is using the previously described polynomial with coefficients different than 1. Two particular cases of this type of MA's are the Spencer and the Henderson moving averages processes, their weighting is useful to eliminate the irregular and the seasonal components of series.

MCD Moving Average Estimation

The Months of Cyclical Dominance MA estimate is one type of MA that determines the length of the MA process, depending on the variability of the series to be smoothed.

MCD is defined as the number of months needed for the average change in the irregular component to become smaller than the average change in the trend component. The first step involved in the estimation of the MCD is the decomposition of the series into its trend-cyclical and irregular components. To accomplish this task, a Henderson thirteen months moving average is estimated (eq. 4.1):

$$H(Y, n) = \sum_{t=-6}^6 a_{t+6} Y_t \quad (4.1)$$

The series (H) arising from the Henderson MA is an estimate of the trend-cycle component of the Y. Therefore, obtaining the ratio of the seasonal adjusted series to the Henderson MA gives an estimate of the error component of the series.

$$\frac{Y_t}{H_t} = \frac{T_t C_t E_t}{T_t C_t} = E_t \quad (4.2)$$

From the tend-cycle and random components we obtain the percentage change for 1 to 5 months and their overall averages:

$$\frac{\sum_{t=2}^n \frac{|X_t - X_{t-j}|}{X_{t-1}}}{(n-j)} \quad \text{for } j = 1 \dots 5 \quad (4.3)$$

Changes in the irregular component dominate those in the trend-cycle during the first months. However, as the time span increases, changes in the trend cycle become larger and dominate those in the irregular component.

Once the MCD scalar has been obtained for each series, it is used as the length of a moving average process applied to the series.¹⁴ This moving average removes the irregular component of the series.

2) DETRENDING THE SERIES: HODRICK-PRESCOTT FILTER

The Hodrick-Prescott Filter (after the paper from Hodrick & Prescott, 1997) is a smoothing technique that decomposes time series in two components: the trend (g_t) and the cycle (c_t)

$$y_t = g_t + c_t \quad \text{for } t = 1, \dots, T \quad (4)$$

There is no seasonal component on the series because it has been previously removed with the X-11 seasonal adjustment method. The smoothed series are obtained by minimizing the variance of secondly adjusted raw series y_t around its trend component. The programming problem is

$$\underset{\{g_t\}_{t=1}^T}{\text{Min}} \left\{ \sum_{t=1}^T c_t^2 + \lambda \sum_{t=1}^T [(g_t - g_{t-1}) - (g_{t-1} - g_{t-2})]^2 \right\} \quad (5)$$

where the Lagrange multiplier λ controls the variability¹⁵ of the trend component, e.g., the smoothness of g_t .¹⁶

The HP filter is a good alternative for the Phase Average Trend (PAT) method, originally used in this forecasting exercise. Both techniques provide similar estimates of the trend component, and the recent widespread use of the HP Filter makes it an attractive alternative due to its simple estimation. It also avoids some of the problems intrinsic to PAT procedures like the dependency on the peak-trough estimation, which can lead to biases depending on the nature of the real trend of the series and the MA process used to separate it.

¹⁴ For practical reasons the length of this MA is limited to 1- 6 periods.

¹⁵ Measured as the second difference of the series.

¹⁶ Typically $\lambda=14,400$ is chosen for monthly data.

3) NORMALIZATION AND AGGREGATION OF THE SERIES

Given the wide variability in amplitudes across series, forming the CLI with a simple average of non-standardized variables may generate distortions in the construction of the final index. To avoid this problem a normalization technique is applied to the cyclical component of the MCD-smoothed series that form the CLI. The steps include obtaining the difference between the series and its mean, calculating the mean absolute value of this difference, and using this scalar as a standardizing factor, dividing each variable. By adding 100 to the series they are expressed as an index number.

4) TURNING POINTS, THE BRY-BOSCHAN TECHNIQUE

The Bry-Boschan technique for selecting turning points consists of:

- 1) Determining trend and cycle elements by weighted moving averages. Exclude local critical points by postulating minimum cycle duration.
- 2) Establishing the immediate neighborhood of potential turns on a slightly smoothed trend by means of a short term moving average.
- 3) Choosing preliminary turning points from the un-smoothed data, testing below noted constraints.

Some useful suggestions for identifying turning points:

- Cycles (from peak to peak or from trough to trough) must have duration greater than 15 months and shorter than 12 years.
- Amplitude of a *doubtful* expansion (or contraction) must not be materially smaller than that of the smallest *clearly recognized* cycle in the series.
- Select highest and lowest points
- Peaks & troughs alternate
- On equal values we generally choose with the last one
- With “Double Turns” we usually pick the last high month before the downward trend, however if the period between the two peaks contains mainly downward movements and only one or two steep rises, then we chose the first high.
- Recognition of ridges and valleys

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
WPS2340	Currency Substitution in Latin America: Lessons from the 1990s	Pere Gomis-Porqueras Carlos Serrano Alejandro Somuano	May 2000	M. Puentes 39621
WPS2341	The Tyranny of Concepts: CUDIE (Cumulated, Depreciated Investment Effort) Is <i>Not</i> Capital	Lant Pritchett	May 2000	R. Widuri
WPS2342	What Can We Learn about Country Performance from Conditional Comparisons across Countries?	Martin Ravallion	May 2000	P. Sader 33902
WPS2343	Ownership and Performance of Lithuanian Enterprises	David A. Grigorian	May 2000	D. Brown 33542
WPS2344	Designing Direct Subsidies for Water and Sanitation Services: Panama—A Case Study	Vivien Foster Andrés Gómez-Lobo Jonathan Halpern	May 2000	S. Delgado 37840
WPS2345	Information and Modeling Issues in Designing Water and Sanitation Subsidy Schemes	Andrés Gómez-Lobo Vivien Foster Jonathan Halpern	May 2000	S. Delgado 37840
WPS2346	The Middle Class Consensus and Economic Development	William Easterly	May 2000	K. Labrie 31001
WPS2347	Terror as a Bargaining Instrument: A Case Study of Dowry Violence in Rural India	Francis Bloch Vijayendra Rao	May 2000	P. Sader 33902
WPS2348	Taxing Issues with Privatization: A Checklist	Jack M. Mintz Duanjie Chen Evangelia Zorotheos	May 2000	G. Chenet-Smith 36370
WPS2349	Trade, Foreign Direct Investment, and International Technology Transfer: A Survey	Kamal Saggi	May 2000	R. Bonfield 31248
WPS2350	Multilateral Trade Liberalization and Political Disintegration: Implications for the Evolution of Free Trade Areas and Customs Unions	Maurice Schiff	May 2000	L. Tabada 36896
WPS2351	Environmental Policy and Time Consistency: Emissions Taxes and Emissions Trading	Peter W. Kennedy Benoît Laplante	May 2000	Y. D'Souza 31449

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
WPS2352	How Stronger Patent Protection in India Might Affect the Behavior of Transnational Pharmaceutical Industries	Carsten Fink	May 2000	L. Tabada 36896
WPS2353	The São Mateus-Jabaquara Trolleybusway Concession in Brazil	Jorge Rebelo Pedro Machado	May 2000	S. Van Veldhuizen 38722
WPS2354	When the Bureaucrats Move out of Business: A Cost-Benefit Assessment of Labor Retrenchment in China	Yi Chen Ishac Diwan	May 2000	M. Yafi 34649
WPS2355	Greed and Grievance in Civil War	Paul Collier Anke Hoeffler	May 2000	A. Kitson-Walters 33712
WPS2356	Bureaucratic Delegation and Political Institutions: When Are Independent Central Banks Irrelevant?	Philip Keefer David Stasavage	June 2000	P. Sintim-Aboagye 37644
WPS2357	Evaluating Carbon Offsets from Forestry and Energy Projects: How Do They Compare?	Kenneth M. Chomitz	June 2000	J. Ancrum 33512
WPS2358	Why Infrastructure Financing Facilities Often Fall Short of Their Objectives	Daniela Klingebiel Jeff Ruster	June 2000	M. Salehi 37157
WPS2359	Reducing Carbon Dioxide Emissions Through Joint Implementation of Projects	Will Martin	June 2000	L. Tabada 36896
WPS2360	Corruption and the Composition of Foreign Direct Investment: Firm-Level Evidence	Beata K. Smarzynska Shang-Jin Wei	June 2000	H. Sladovich 37698
WPS2361	The Welfare Effects of Private Sector Participation in Guinea's Urban Water Supply	George Clarke Claude Ménard Ana Maria Zuluaga	June 2000	H. Sladovich 37698
WPS2362	A Transitory Regime: Water Supply in Conakry, Guinea	Claude Ménard George Clarke	June 2000	H. Sladovich 37698
WPS2363	Would Collective Action Clauses Raise Borrowing Costs? An Update and Additional Results	Barry Eichengreen Ashoka Mody	June 2000	S. Kpundeh 39591
WPS2364	Perverse Effects of a Ratings-Related Capital Adequacy System	Patrick Honohan	June 2000	A. Yaptenco 38526

6/23